CORIXIDAE (WATER BOATMEN) OF THE SOUTH DAKOTA GLACIAL LAKE DISTRICT[1]

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Introduction

The genus and species designations of many North American corixids were uncertain prior to the revision of the family, Corixidae, by Hungerford (1948) and Sailer (1948). Pennak (1953) described the taxonomy of corixids as undoubtedly the most difficult of all families of aquatic and semiaquatic Hemiptera. Hungerford (1948) presented a history of the confused state of the taxonomy of the family Corixidae from the time Linnaeus described the first corixid in 1758 until the time Hungerford published his monograph. The difficulties in classifying corixids are due to great similarity in various genera and species and the lack of distinctive, easily observed diagnostic morphology. Many species are variable in structural detail, and most identification is based on morphology of males. Females and nymphs are generally associated with males in a sample for identification.

There are about 115 known species of Corixidae in the United States, 23 of which occur in South Dakota. Nine genera and 18

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species are representative of the Eastern South Dakota Lake District. Specimens from South Dakota are in the South Dakota State University Insect Collection. Specimens have been taken by light trapping and random field collecting with no emphasis on population structure or ecology. Objectives of this study were to determine habitat preference, species composition and relative abundance and to construct a simplified key to the Corixidae of the South Dakota Glacial Lake District.

Study Area

The South Dakota Glacial Lake District is located primarily within the Big Sioux River Basin (1,633,039 ha) from 44° to 46° North latitude. Lakes, pothole, and marshes were formed approximately 20,000 years ago during the Wisconsin ice age (Flint 1955). Surface waters are high in sulfate, chloride, calcium, and magnesium (Schmidt 1967). Concentrations of dissolved solids are indicative of high productivity and all surface waters are eutrophic.

Methods

Corixid collections were taken with a dip net from 43 lakes, 28 marshes and five locations on the Big Sioux River. Each collection represented approximately 30 min. sampling time. Collections were made in August 1970, at the time adults of all species were represented and prior to fall migrations. Collections were preserved in 10 percent formalin and identified to species and sex. Permanent mounts of male genital capsule, pala, and strigil were made in Turtox CMC Mounting Medium. Diagnostic morphology described by Hungerford (1948) and Sailer (1948) was used to construct a key to the Corixidae of South Dakota.

Results and Discussion

Species compostion and relative abundance indicates distinct differences in habitat types (Table 1). *Trichocorixa borealis, Palmacorixa buenoi, Trichocorixa naias, Cenocorixa dakotensis,* and *Trichocorixa verticalis* comprised 96 percent of 4,543 specimens from lakes, *Sigara conocephala* and *S. alternata* occurred at low densities, but ranked high in the number of lake collections. *Trichocorixa naias, Hesperocorixa vulgaris, S. alternata, T. verticalis,* and *S. bicoloripennis* comprised 91 percent of 1588 specimens

from marshes. *Callicorixa audeni* and *Sigara solensis* occurred at low densities, but ranked high in the number of marsh samples.

The percent composition and percent occurrence suggests that *T. borealis, C. dakotensis, S. decoratella* and *S. conocephala* were predominantly lake species. *Corisella tarsalis, Callicorixa audeni, H. vulgaris* and *Cenocorixa utahensis* were marsh species. *Sigara grossolineata* was a river species that comprised 53 percent of the 228 corixids from river collections. *Trichocorixa verticalis* was a lake-marsh species, *P. buenoi* a lake-river species, *S. alternata* a marsh-river species, and *T. naias* and *Sigara solensis* were lake-marsh-river species. *Cymatia americana* was a rare species in one lake and two marsh collections. *Cymatia americana* like *P. bueoni* has reduced and nonfunctional flight wings and is restricted to permanent bodies of water with sufficient depth to permit winter survival.

Species diversity ranged from zero to seven. Corixids were not taken at Lake Henry, Kingsbury County; Lake Cochrane, Deuel County; Red Iron Lake, Marshall County; and Clear Lake, Roberts County. Dense blue-green algal blooms were present in each of these lakes except Lake Cochrane. Lake Cochrane had the greatest transparency of all sampling sites. The lake also had an abundant yellow perch, *Perca flavescens* (Mitchill), population. Stagnation and fish predation may be responsible for the lack of observable populations in such lakes. The most frequent number of species in any one sample was two in lake samples and four in marsh samples. Thirteen samples had from five to seven species.

Eight genera and 16 species of corixids were collected in this study. Species previously collected in Eastern South Dakota, but not collected in this study are *Ramphocorixa acuminata* (Uhler), *Trichocorixa calva* (Say), *T. kanza* Sailer and *Sigara compressoidea* (Hungerford). *Ramphocorixa acuminata* is a pond species taken in light traps at Brookings in 1942. *Trichocorixa calva* was collected at the southern boundary of the state in 1940 and *T. kanza* was collected at the southern boundary of the state in 1945 and 1946,

and represent the extreme northern range for these species. A single female specimen of *S. compressoidea* was reported by Hungerford (1948) to have been collected in South Dakota. *Callicorixa audeni* was present in two lake samples and 11 marsh samples in this study, but not listed as a South Dakota species by Hungerford. Species occurring in South Dakota west of the Missouri River and not observed in this study are *Hesperocorixa michigenensis* (Hungerford), *H. laevigata* (Uhler) and *Sigara penniensis* (Hungerford). The following key includes species of Corixidae observed in this study and Corixidae previously observed in the state of South Dakota. Morphological terms used in the key are illustrated in Figure 1. Reference should be made to Hungerford (1948) and Sailer (1948) for detailed taxanomic descriptions and distributions.

Key To Genera And Species of Male Corixidae of South Dakota

1. Rostrum without transverse sulcations; pala long and narrow without a peg row.... ..... Subfamily....Cymatinae Hungerford
   Cymatia Flor
   C. americana Hussey

1'. Rostrum with transverse sulcations; pala broad and having a peg row..... ..... Subfamily....Cprixinae Enderlein 2

2. Males with sinistral asymmetry; strigil on left side; pala short and triangular..... .....**Trichocorixa** Kirkaldy 3

2'. Males with dextral asymmetry; strigil on right side or lacking..... 7

3. Strigil oval. Males 3.3–3.8 mm..... .....**T. naias** (Kirkaldy)

3'. Strigil elongate..... 4

4. Strigil elongate with anterior and posterior margins nearly parallel and straight .....**T. verticalis interiores** Sailer

4'. Strigil elongate and curved along lateral margin, of left tergal lobe of sixth abdominal segment..... 5

5. Strigil appearing as a heavy dark line along lateral margin of left tergal lobe of sixth abdominal segment..... .....**T. calva** (Say)

5'. Strigil showing definite transverse comblike row of teeth..... 6

6. Strigil anterior and posterior margins nearly parallel; pala dorsal margin angulate, pegs arranged in shape of inverted V..... .....**T. kanza** Sailer

6'. Strigil anterior and posterior margins not parallel–widened in medial half; pala dorsal margin and pegs smoothly curved and not angulate and arranged in shape of inverted V..... **T. borealis** Sailer

7. Seventh dorsal tergite just to right of middle with a pencil of long hairs and a curved dextral sclerotized hook; hemelytral pattern reticulate..... **Palmacorixa** Abbott
P. buenoi Abbott

7'. Not as above..... 8

8. Pala with a single or double conspicuous peg in the upper row position; embrowned hind tarsus ..... **Corisella** Lundblad
C. tarsalis (Fieber)

8'. Not as above..... 9

9. Upper surface of pala deeply incised; head of male strongly produced and carinate..... **Ramphocorixa** Abbott
R. acuminata Abbott

9'. Not as above..... 10

10. Male palar pegs in two rows; strigil lacking..... **Callicorixa** B. White
C. audeni Hungerford

10'. Male palar pegs in one row; strigil present..... 11

11. Apex of pala blunt, rounded or truncated; prothoracic lobe quadrate or trapezoidal; claval suture shorter than post-nodal prunose area.....
Hesperocorixa Kirkaldy 12

11'. Not as above..... 14

12. Mesoepimeron at level of scent gland osteole considerable broader than the lateral lobe of prothorax; body length 6.3-7.2mm.....
.....**H. michiganensis** (Hungerford)

12'. Mesoepimeron at level of scent gland osteole plainly narrower than lateral lobe of prothorax; body length 〉8.0 mm..... 13

13. Pattern of hemelytra reticulate..... **H. laevigata** (Uhler)

13'. Pattern of hemelytra not reticulate, corium transversely marked with pale, slightly zigzag lines ..... **H. vulgaris** (Hungerford)

14. Pattern of hemelytra reticulate.....
.....**Cenocorixa** Hungerford..... 15

14'. Pattern of hemelytra not reticulate, corium transversely marked with lines .....**Sigara** Fabricius..... 16

15. Last tarsal segment of hind leg embrowned to black.....
..... **C. dakotensis** (Hungerford)

15'. Last tarsal segment of hind leg pale.....
..... **C. utahensis** Hungerford)

16. Body length 〉6.3 mm..... 17

16'. Body length 〈6.3 mm..... 19

17. Pala with 14-16 lower palmar hairs..... **S. decoratella** (Hungerford)

17'. Pala with 18-20 lower palmar hairs..... 18

18. Male vertex conically produced.....**S. conocephala** (Hungerford)

18'. Male vertex rounded, not conically produced.....
.....**S. penniensis** (Hungerford)

19. Dark bands of pronotal disk interrupted down middle by longitudinal pale band ..... **S. compressoidea** (Hungerford)

19'. Dark bands of pronotal disk not interrupted down middle by longitudinal pale band..... 20

20. Metaxyphus longer than broad ..... **S. solensis** (Hungerford)
20'. Metaxyphus not longer than broad 21
21. Metaxyphus end blunt; scent gland osteole nearer lateral bend of mesoepimeron than to its tip; mesoepimeron connected to metasternum by broad, often dark posteoxal piece (lateral flange of the sternellum) ..... **S. grossolineata** Hungerford
21'. Metaxyphus end pointed; scent gland osteole nearer to tip than to lateral bend of mesoepimeron 22
22. Metaxyphus tip a right angle ..... **S. bicoloripennis** (Walley)
22'. Metaxyphus sides forming less than right angle; mesoepimeron of equal width from osteole to lateral bend ..... **S. alternata** (Say)

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ABSTRACT.–Corixids collected in August 1970, from lakes, marshes, and the Big Sioux River of the South Dakota Glacial Lake District indicated distinct differences in habitat type and species composition. *Trichocorixa borealis, T. naias, T. verticalis, Palmacorixa buenoi,* and *Cenocorixa dakotensis* comprised 96 percent of 4,543 specimens from 43 lakes. *Trichocorixa naias, T. verticalis, Hesperocorixa vulgaris, Sigara alternata* and *S. bicoloripennis* comprised 91 percent of 1588 specimens from 28 marshes. Percent composition and percent occurrence suggests that *T. borealis, C. dakotensis, Sigara decoratella* and *S. conocephala* were predominantly lake species. *Corisella tarsalis, Callicorixa audeni, Cenocorixa utahensis* and *H. vulgaris* were marsh species. *Sigara grossolineata* was a river species, *T. verticalis* a lake-marsh species, *P. buenoi* a lake-river species, *S. alternata* a marsh-river species, and *T. naias* and *Sigara solensis* were lake-marsh-river species. A key to the Corixidae of South Dakota is given. Richard L. Applegate, South Dakota Cooperative Fishery Unit and Department of Entomology and Zoology, South Dakota State University, Brookings 57006.

Descriptors:-Hemiptera; Corixidae (water boatmen), species occurring in South Dakota Glacial Lake District.

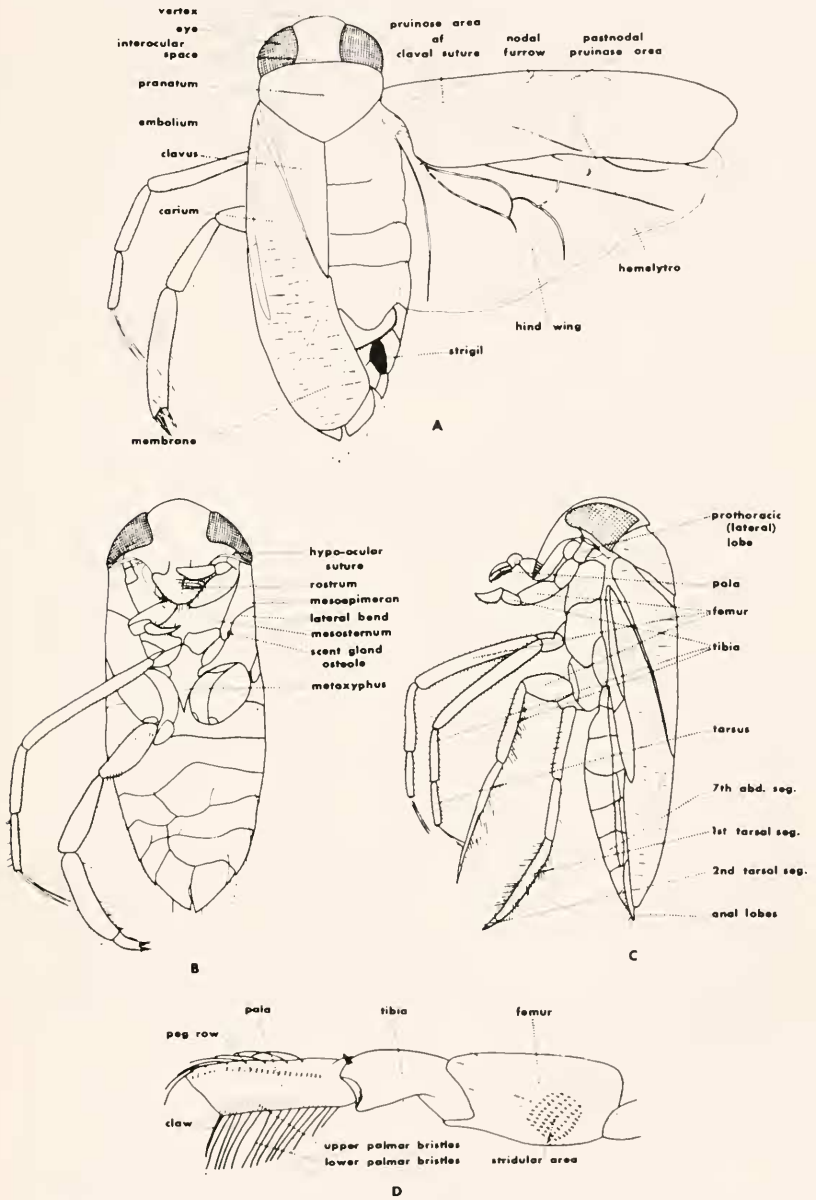

Figure 1. Morphology of Corixidae (modified from Hungerford 1948 by Hilsenhoff 1970). A. Dorsal view of male. B. Ventral view of male. C. Lateral view of female. D. Foreleg of male.

Table 1. Percent composition and percent occurrence of Corixidae in lakes, marshes, and Big Sioux River of the South Dakota Glacial Lake District, August 1970.

Species	Lakes			Marshes			Big Sioux River		
	No.	Percent	Percent Occurrence	No.	Percent	Percent Occurrence	No.	Percent	Percent Occurrence
Cymatia americana Hussey	1	.0	2.3	3	.2	7.1			
Palmacorixa buenoi Abbott	1215	26.7	53.5	0	.0	.0	68	29.8	75.0
Corisella tarsalis (Fieber)	0	.0	.0	45	2.8	3.6			
Trichocorixa verticalis (Fieber)	164	3.6	9.3	126	7.9	10.7			
T. naias (Kirkaldy)	361	8.0	23.3	584	36.8	60.7	14	6.1	25.0
T. borealis Sailer	2384	52.5	67.4	7	.4	14.3	5	2.2	50.0
Callicorixa audeni Hungerford	3	.1	4.7	40	2.5	39.3			
Hesperocorixa vulgaris (Hungerford)	10	.2	11.6	368	23.2	78.6	1	.5	25.0
Cenocorixa dakotensis (Hungerford)	253	5.6	32.6	25	1.6	7.1			
C. utahensis (Hungerford)	7	.1	7.0	17	1.1	7.1			
Sigara bicoloripennis (Walley)	8	.2	7.0	67	4.2	10.7	1	.5	25.0
S. decoratella (Hungerford)	10	.2	4.7	1	.1	3.6			
S. conocephala (Hungerford)	100	2.2	32.6	1	.1	3.6			
S. alternata (Say)	10	.2	16.3	294	18.5	67.9	16	7.0	50.0
S. grossolineata (Hungerford)	0	.0	.0	0	.0	.0	120	52.6	75.0
S. solensis (Hungerford)	17	.4	7.0	10	.6	17.9	3	1.3	25.0
	4543			1588			228		